FORM PTO-1390 (Modified) (REV 10-95) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 1941

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR): 10/030282

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE 00/02059	JUNE 24, 2000	JULY 12, 1999

TITLE OF INVENTION

METHOD FOR PREPARATION OF SOURCE-CODED DATA, AND TRANSMITTER AND RECEIVER THEREFOR

APPLICANT(S) FOR DO/EO/US

Frank HOFMANN, Torsten MLASKO

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 18 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
    A **SECOND** or **SUBSEQUENT** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☒ Certificate of Mailing by Express Mail
19. ☐ Other items or information:

EL 755 324 169 US

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/030282	PCT/DE 00/02059	1941

20. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Search Report has been prepared by the EPO or JPO	**$930.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482)	**$720.00**
☐	No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2))	**$790.00**
☒	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO	**$1,070.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)	**$98.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =	**$890.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	8 - 20 =	0	x $18.00	**$0.00**	
Independent claims	4 - 3 =	1	x $80.00	**$80.00**	
Multiple Dependent Claims **(check if applicable).**			☐	**$0.00**	
	TOTAL OF ABOVE CALCULATIONS =			**$970.00**	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable).** ☐				**$0.00**	
	SUBTOTAL =			**$970.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**	
	TOTAL NATIONAL FEE =			**$970.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☐				**$0.00**	
	TOTAL FEES ENCLOSED =			**$970.00**	
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				charged	$

☐ A check in the amount of to cover the above fees is enclosed.

☒ Please charge my Deposit Account No. **19-4675** in the amount of **$970.00** to cover the above fees.
A duplicate copy of this sheet is enclosed.

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NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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MICHAEL J. STRIKER
NAME

27233
REGISTRATION NUMBER

JANUARY 7, 2002
DATE

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: Group: Attorney Docket # 1941

Applicant(s) : HOFMANN, F., ET AL

Serial No. :

Filed :

For : METHOD FOR PREPARATION OF SOURCE-CODED DATA, AND TRANSMITTER AND RECEIVER THEREFOR

SIMULTANEOUS AMENDMENT

January 7, 2002

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the claims so as to eliminate their multiple dependency.

Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,

Michael J. Striker
Attorney for Applicant(s)
Reg. No. 27233

Claims

1. A method for transmission-end preparation of source-coded audio data of at least one useful signal source (1), in particular for transmission via AM channels of a predetermined channel raster, with the following features:
- the source-coded audio data of at least one useful signal source (1) are separated (2) into a main data stream (HD) and at least one auxiliary data stream (ZD), where the main data stream (HD) contains at least the amount of information that is required for a comprehensible reproduction of at least one useful signal source (1) and the auxiliary data stream (ZD) contains information for quality improvement,
- the main- and auxiliary data streams (HD, ZD) are modulated and accommodated in respective different channels (K1, K2) of the predetermined channel raster.

2. A method for receiver-end preparation of audio data, which are contained in main- and auxiliary data streams (HD, ZD), in particular for transmission via AM channels of a predetermined channel raster, where mutually associated main- and auxiliary data streams (HD, ZD) each originate from at least one useful signal source (1) and the mutually associated main- and auxiliary data streams are accommodated in respective different channels (K1, K2) of the predetermined channel raster, including the following steps:
- a receiver (4) with a low reproduction quality is used to demodulate and decode only the main data stream (HD),
- a receiver (7) with higher reproduction quality is intentionally used to demodulate and decode only the main data stream (HD) or the main data stream (HD) and at least one associated auxiliary data stream (ZD) are demodulated and decoded, where mutually associated demodulated and decoded data streams are linked to one another in such a way that an increase is achieved in the reproduction quality for the at least one useful data source (1).

3. The method according to claim 1 [or 2], characterized in that a signaling is incorporated into the main data stream (HD) on the transmitter end, which indicates

whether an auxiliary data stream (ZD) is provided for the same useful signal source (1) and in what channel it is provided.

4. The method according to [one of claims 1 to 3] claim 1, characterized in that additional information is incorporated into an auxiliary data stream (HD), which indicates what information the auxiliary data stream contains and optionally, how the main data stream (HD) is to be combined on the receiver end with the at least one associated auxiliary data stream (ZD).

5. The method according to [one of claims 2 to 4] claim 2, characterized in that the linkage of the associated main data- and auxiliary data streams is executed in accordance with at least one of the following criteria:
- to reduce the amount of coding artifacts,
- to increase bandwidth for the reproduction of audio data,
- to generate a stereo signal.

6. The method according to [one of claims 1 to 5] claim 1, characterized in that the scalability of MPEG 4 data streams is used to separate the source-coded audio data of the useful signal source (1) into the main data stream (HD) and at least one auxiliary data stream (ZD).

7. A transmitter for the preparation of source-coded audio data from at least one useful signal source (1), in particular for transmission via AM channels of a predetermined channel raster, with the following features:
- a separation device (2) for the audio data of a useful signal source (1) into a main data stream (HD) and at least one associated auxiliary data stream (ZD),
- a modulation unit (3) modulating the main- and auxiliary data streams, where this modulation unit (3) can in particular be supplied with carrier signals in such a way that mutually associated main- and auxiliary data streams can be transmitted in respective different channels of a predetermined channel raster.

8. A receiver for receiver-end preparation of source-coded audio data, which are accommodated in main- and auxiliary data streams, in particular for transmission via AM channels of a predetermined channel raster, with the following features:

- a demodulation unit (5,8) and decoding unit (6,9) for at least main data streams (HD),
- an evaluation unit (10) for a signaling and optional additional information, where the signaling indicates which channel contains an auxiliary data stream (ZD) associated with a main data stream (HD) and the optionally provided additional information indicate what information the auxiliary data stream (ZD) contains and how the main data stream (HD) is to be combined with the at least one auxiliary data stream (ZD) on the receiver end,
- a linkage unit (8) for mutually associated main- and auxiliary data streams, which can be controlled by the evaluation unit (10).

Claims

1. A method for transmission-end preparation of source-coded audio data of at least one useful signal source (1), in particular for transmission via AM channels of a predetermined channel raster, with the following features:
- the source-coded audio data of at least one useful signal source (1) are separated (2) into a main data stream (HD) and at least one auxiliary data stream (ZD), where the main data stream (HD) contains at least the amount of information that is required for a comprehensible reproduction of at least one useful signal source (1) and the auxiliary data stream (ZD) contains information for quality improvement,
- the main- and auxiliary data streams (HD, ZD) are modulated and accommodated in respective different channels (K1, K2) of the predetermined channel raster.

2. A method for receiver-end preparation of audio data, which are contained in main- and auxiliary data streams (HD, ZD), in particular for transmission via AM channels of a predetermined channel raster, where mutually associated main- and auxiliary data streams (HD, ZD) each originate from at least one useful signal source (1) and the mutually associated main- and auxiliary data streams are accommodated in respective different channels (K1, K2) of the predetermined channel raster, including the following steps:
- a receiver (4) with a low reproduction quality is used to demodulate and decode only the main data stream (HD),
- a receiver (7) with higher reproduction quality is intentionally used to demodulate and decode only the main data stream (HD) or the main data stream (HD) and at least one associated auxiliary data stream (ZD) are demodulated and decoded, where mutually associated demodulated and decoded data streams are linked to one another in such a way that an increase is achieved in the reproduction quality for the at least one useful data source (1).

3. The method according to claim 1, characterized in that a signaling is incorporated into the main data stream (HD) on the transmitter end, which indicates

whether an auxiliary data stream (ZD) is provided for the same useful signal source (1) and in what channel it is provided.

4. The method according to claim 1, characterized in that additional information is incorporated into an auxiliary data stream (HD), which indicates what information the auxiliary data stream contains and optionally, how the main data stream (HD) is to be combined on the receiver end with the at least one associated auxiliary data stream (ZD).

5. The method according to claim 2, characterized in that the linkage of the associated main data- and auxiliary data streams is executed in accordance with at least one of the following criteria:
- to reduce the amount of coding artifacts,
- to increase bandwidth for the reproduction of audio data,
- to generate a stereo signal.

6. The method according to claim 1, characterized in that the scalability of MPEG 4 data streams is used to separate the source-coded audio data of the useful signal source (1) into the main data stream (HD) and at least one auxiliary data stream (ZD).

7. A transmitter for the preparation of source-coded audio data from at least one useful signal source (1), in particular for transmission via AM channels of a predetermined channel raster, with the following features:
- a separation device (2) for the audio data of a useful signal source (1) into a main data stream (HD) and at least one associated auxiliary data stream (ZD),
- a modulation unit (3) modulating the main- and auxiliary data streams, where this modulation unit (3) can in particular be supplied with carrier signals in such a way that mutually associated main- and auxiliary data streams can be transmitted in respective different channels of a predetermined channel raster.

8. A receiver for receiver-end preparation of source-coded audio data, which are accommodated in main- and auxiliary data streams, in particular for transmission via AM channels of a predetermined channel raster, with the following features:

- a demodulation unit (5,8) and decoding unit (6,9) for at least main data streams (HD),
- an evaluation unit (10) for a signaling and optional additional information, where the signaling indicates which channel contains an auxiliary data stream (ZD) associated with a main data stream (HD) and the optionally provided additional information indicate what information the auxiliary data stream (ZD) contains and how the main data stream (HD) is to be combined with the at least one auxiliary data stream (ZD) on the receiver end,
- a linkage unit (8) for mutually associated main- and auxiliary data streams, which can be controlled by the evaluation unit (10).

VERIFICATION OF TRANSLATION

I, DAVID CLAYBERG

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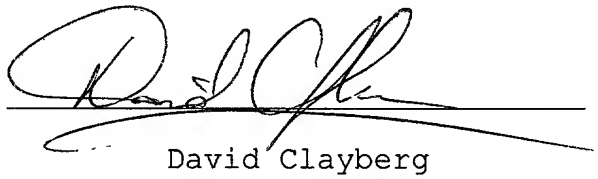
declare that I am a certified translator well acquainted with both the German and English languages, and that the attached is an accurate translation, to the best of my knowledge and ability, of the attached German Patent Application.

Signature  Date December 31, 2001

David Clayberg

2/prts

Method for Preparation of Source-Coded Data, and Transmitter and Receiver Therefor

Prior Art

The invention is based on a method for transmitter-end or receiver-end preparation of source-coded audio data of at least one useful signal source, in particular for transmission via AM channels of a predetermined channel raster.

For the transmission of digital audio data, particularly via AM channels of a predetermined channel raster with channels that are 9 or 10 kHz in width (mediumwave in America) in medium- and longwave formats, as well as in shortwave format, three different transmission systems were developed within the DRM consortium (Digital Radio Mondiale). All of these systems use a conventional AM channel for transmission. In the T2M method, the digital information can be linked via an auxiliary carrier to the low-frequency input of the transmitter and can be transmitted parallel to the AM analog signal (Funkschau [Radio Show] no. 14, 1998, pp 44 to 46). The Skywave 2000 method uses a multiple carrier method with TCM modulation (Trellis Code Modulation) in connection with QAM (Conference Paper of the 51st Broadcast Engineering Conference, NAB 97, pp. 27 to 48, Progress Towards the Development of Digital Modulation in the Longwave, Mediumwave, and Shortwave Bands; IBE, Transmission Engineering, March 1999, pp. 53 and 54).

Advantages of the Invention

With the steps taken according to the claims, it is possible to achieve an increase in reproduction quality, for example an improved tonal quality, without having to deviate from the predetermined channel raster, as is required in the methods mentioned at the beginning or which can only be achieved by these methods without quality loss by means of an expensive encoding. With the embodiment according to invention, with a coupling of a main data stream and at least one auxiliary data stream in different channels of the channel raster, the receiver-end useful data rate can be increased and therefore a quality

improvement can be achieved in comparison with conventional methods. With the method according to invention, it is possible, through the use of simpler receivers, to demodulate and decode only the main data stream, which results in a comprehensible reproduction with a low bit rate of approximately 24 kilobit/s. Receivers with a high reproduction quality demodulate and decode both the main data stream and also at least one auxiliary data stream of a useful signal and link these two data streams so that a higher reproduction quality is achieved.

In DVB signals, there is also a separation into a base layer and an enhancement layer. However, these layers are transmitted on the same channel. By contrast to the invention, with this system, a simple receiver must receive the entire data stream and can only execute a separation afterward.

The method according to the invention permits the achievement of numerous combinations for increasing reproduction quality, for example in order to reduce the amount of coding artifacts, increase audio bandwidth, or increase the impression of three-dimensional sound, e.g. the transition from mono to stereo.

Drawings

Exemplary embodiments of the invention will be explained in detail in conjunction with the drawings.

Fig. 1 shows the transmitter-end and receiver-end preparation of audio data according to the invention,

Fig. 2 shows the AM channels within a predetermined channel raster,

Fig. 3 shows the transmitter-end and receiver-end preparation of audio data according to the invention, with a receiver for high-quality reproduction,

Fig. 4 shows the preparation of a stereo signal,

Fig. 5 shows combinations for separating and combining audio data in a base layer and an enhancement layer.

Description of the Exemplary Embodiments

In the embodiment of the invention according to Fig. 1, for example PCM data of a useful signal source 1 are encoded on the transmitter end by means of a source encoder 2. In this case, the encoded signal is separated into a main data stream HD (base layer) and at least one auxiliary data stream ZD (enhancement layer), i.e. the source encoder 2 in this exemplary embodiment functions simultaneously as a separation device for the audio data of the useful signal source 1. The main- and auxiliary data stream are modulated by means of a modulation unit 3 and are accommodated in respective different channels that are spaced apart by 9 kHz, for example the adjacent channels K1 and K2 shown in Fig. 2 of the predetermined channel raster, e.g. of the AM middle channel raster. For the transmission of the main- and auxiliary data stream into the different channels K1 and K2, the respective carrier signals for these channels are supplied to the modulation unit 3. Naturally, these channels do not have to be adjacent, as shown in Fig. 2, but can be accommodated at any location in the predetermined channel raster. Channels that can be used for the auxiliary data ZD can include, for example, channels that are freed by parallel program broadcasting due to the increased range of digital modulation or channels that have been or will be created through band expansion as a result of channels no longer being needed by other services (coastal radio, marine radio, aeronautical radio), for example expansion of the AM mediumwave range in the USA between 1600 and 1660 kHz or the shortwave range in the 31, 25, and 19 meter band.

The data streams transmitted via separate channels are demodulated and decoded on the receiver end. In the exemplary embodiment according to Fig. 1, a base receiver 4

is provided, i.e. a receiver with low reproduction quality, which demodulates and decodes only the main data stream HD by means of the modulator 5 and source decoder 6. This is possible because the main data stream according to the invention contains at least the amount of information from a useful signal source that is required for a comprehensible reproduction of the useful signal source. For example, the main data stream HD contains just enough information from the useful signal source for the reproduction quality not to differ from the reproduction quality in the AM channels in mediumwave, longwave, and shortwave formats, i.e. acceptable speech comprehension, but with quality losses in music transmissions.

In the exemplary embodiment according to Fig. 3, on the transmitter end, the same signal preparation occurs as in the exemplary embodiment according to Fig. 1, but on the receiver end, a receiver 7 with high reproduction quality, for example CD quality, is provided, which demodulates and decodes both the main data stream HD and the associated auxiliary data stream ZD by means of the demodulation unit 8 and the decoding unit 9. In a linking device, the main data stream HD and the associated auxiliary data stream ZD are linked to each other in order to achieve a quality improvement of the audio signal received. In the exemplary embodiment according to Fig. 3, the source decoding unit 9 simultaneously functions as a linkage unit. For the correct linkage of a mutually associated main- and auxiliary data streams, a signaling is incorporated into the main data stream HD (base layer) on the transmitter end, which indicates whether an auxiliary data stream ZD (enhancement layer) is provided for the same useful signal source (program source) and at what frequency, i.e. in what channel, it is provided. Preferably additional information is incorporated into the auxiliary data stream, which indicates what information the auxiliary data stream ZD contains and optionally, how the main data stream HD is to be combined with the at least one associated auxiliary data stream ZD. In order to evaluate the signaling and/or the additional information, an evaluation unit 10 is provided that is preferably associated with the demodulation unit. This evaluation unit 10 controls the linkage unit and the source decoder 9 in accordance with the evaluated signals so that the linkage of associated main- and auxiliary data streams occurs synchronously with one another.

A receiver with high reproduction quality can naturally also execute an intentional demodulation and decoding of only the main data stream HD and can thus be operated as a base receiver.

Examples will be given below for separating out audio data from a useful signal source and possible combinations of the main data stream (base layer) and auxiliary data stream(s) (enhancement layer(s)). In the channel K1 according to Fig. 2, for example, the complete mono audio signal of a program source (useful signal source) can be contained in the main data stream with a low bit rate; channel K2 can contain an auxiliary data stream ZD with all additionally required data for a stereo program, with a possibly higher bit rate. In principle, the separation into the two data streams can be produced with the scalability of MPEG 4. First generation receivers as well as simple favorable receivers are intended to demodulate one channel and decode a monophonic signal. Receivers with higher reproduction quality are provided for the demodulation of both channels K1 and K2 and for the decoding of a stereophonic signal. Consequently, this represents a sensible transition scenario from the use of one channel to the use of two channels. With the introduction of DRM, receivers can be developed which decode only the base layer. After the second channel is subsequently brought on line, these receivers can also receive the base layer along with the enhancement layer. In addition to stereo reproduction, through the linkage of the main data stream with the at least one auxiliary data stream, a quality improvement can be achieved in the following directions: the auxiliary data stream reduces the amount of coding artifacts, the auxiliary data stream broadens the audio bandwidth.

Naturally, any combination of these quality improvement steps can also be made with the addition of stereo reproduction.

Examples of separations between the base- and enhancement layers in mono/stereo encoding are achieved as follows:

Various methods for encoding a stereo signal are provided in the MPEG 4 standard. Of these, the following methods 2 and 3 are suitable for the method according to the invention:

1. Encoding of the right (R) and left (L) channel.
2. MS stereo encoding: based on the original signal, a sum signal (mid) and a difference signal (side) are produced before it is quantified. This is shown in Fig. 3. The mid signal is transmitted in the base layer, the side signal is transmitted in the enhancement layer.
3. Intensity stereo: the right and left channel are not transmitted separately. Only a main channel (base layer) and an additional directional signal (enhancement layer) are transmitted, from which a stereo signal is produced.

Examples for the separation and combination of the main data stream and auxiliary data stream(s) for the production of a variable bit rate are shown in Fig. 5. The first channel, for example channel K1, is used to transmit an encoded signal with a bit rate x. The second channel, for example channel K2, is used to transmit all of the information required for achieving a higher bit rate. As shown by Fig. 5, in addition to an additional bit rate in the enhancement layer, a combination with stereo signals is also possible. Fig. 5 also lists an example for different encoder types, CELP encoders for the base layer and AAC encoders (Advanced Audio Coding) for the enhancement layer.

The different separations below are also possible:

- the base layer contains two audio data streams from different program sources. The enhancement layer contains the data streams for increasing the useful data from the audio program,
- two or more different base layers in different channels each contain a respective audio data stream. The enhancement layer of one channel contains the additional useful data from two or more audio data streams.

Numerous previously proposed methods are suitable for digital modulation, for example the QAM, MPSK, or APSK methods.

Claims

1. A method for transmission-end preparation of source-coded audio data of at least one useful signal source (1), in particular for transmission via AM channels of a predetermined channel raster, with the following features:
- the source-coded audio data of at least one useful signal source (1) are separated (2) into a main data stream (HD) and at least one auxiliary data stream (ZD), where the main data stream (HD) contains at least the amount of information that is required for a comprehensible reproduction of at least one useful signal source (1) and the auxiliary data stream (ZD) contains information for quality improvement,
- the main- and auxiliary data streams (HD, ZD) are modulated and accommodated in respective different channels (K1, K2) of the predetermined channel raster.

2. A method for receiver-end preparation of audio data, which are contained in main- and auxiliary data streams (HD, ZD), in particular for transmission via AM channels of a predetermined channel raster, where mutually associated main- and auxiliary data streams (HD, ZD) each originate from at least one useful signal source (1) and the mutually associated main- and auxiliary data streams are accommodated in respective different channels (K1, K2) of the predetermined channel raster, including the following steps:
- a receiver (4) with a low reproduction quality is used to demodulate and decode only the main data stream (HD),
- a receiver (7) with higher reproduction quality is intentionally used to demodulate and decode only the main data stream (HD) or the main data stream (HD) and at least one associated auxiliary data stream (ZD) are demodulated and decoded, where mutually associated demodulated and decoded data streams are linked to one another in such a way that an increase is achieved in the reproduction quality for the at least one useful data source (1).

3. The method according to claim 1 or 2, characterized in that a signaling is incorporated into the main data stream (HD) on the transmitter end, which indicates

whether an auxiliary data stream (ZD) is provided for the same useful signal source (1) and in what channel it is provided.

4. The method according to one of claims 1 to 3, characterized in that additional information is incorporated into an auxiliary data stream (HD), which indicates what information the auxiliary data stream contains and optionally, how the main data stream (HD) is to be combined on the receiver end with the at least one associated auxiliary data stream (ZD).

5. The method according to one of claims 2 to 4, characterized in that the linkage of the associated main data- and auxiliary data streams is executed in accordance with at least one of the following criteria:
- to reduce the amount of coding artifacts,
- to increase bandwidth for the reproduction of audio data,
- to generate a stereo signal.

6. The method according to one of claims 1 to 5, characterized in that the scalability of MPEG 4 data streams is used to separate the source-coded audio data of the useful signal source (1) into the main data stream (HD) and at least one auxiliary data stream (ZD).

7. A transmitter for the preparation of source-coded audio data from at least one useful signal source (1), in particular for transmission via AM channels of a predetermined channel raster, with the following features:
- a separation device (2) for the audio data of a useful signal source (1) into a main data stream (HD) and at least one associated auxiliary data stream (ZD),
- a modulation unit (3) modulating the main- and auxiliary data streams, where this modulation unit (3) can in particular be supplied with carrier signals in such a way that mutually associated main- and auxiliary data streams can be transmitted in respective different channels of a predetermined channel raster.

8. A receiver for receiver-end preparation of source-coded audio data, which are accommodated in main- and auxiliary data streams, in particular for transmission via AM channels of a predetermined channel raster, with the following features:

- a demodulation unit (5,8) and decoding unit (6,9) for at least main data streams (HD),
- an evaluation unit (10) for a signaling and optional additional information, where the signaling indicates which channel contains an auxiliary data stream (ZD) associated with a main data stream (HD) and the optionally provided additional information indicate what information the auxiliary data stream (ZD) contains and how the main data stream (HD) is to be combined with the at least one auxiliary data stream (ZD) on the receiver end,
- a linkage unit (8) for mutually associated main- and auxiliary data streams, which can be controlled by the evaluation unit (10).

Abstract

Audio data from a useful signal source (1) are separated (2) into a main data stream (HD) and an auxiliary data stream (ZD). The main data stream (HD) contains at least the amount of information that is required for a comprehensive reproduction of at least one useful signal source (1). Main- and auxiliary data streams are transmitted in different channels (K1, K2) within a predetermined channel raster.

It is possible to increase the reproduction quality of the audio signal within a predetermined channel raster.

Fig. 1.

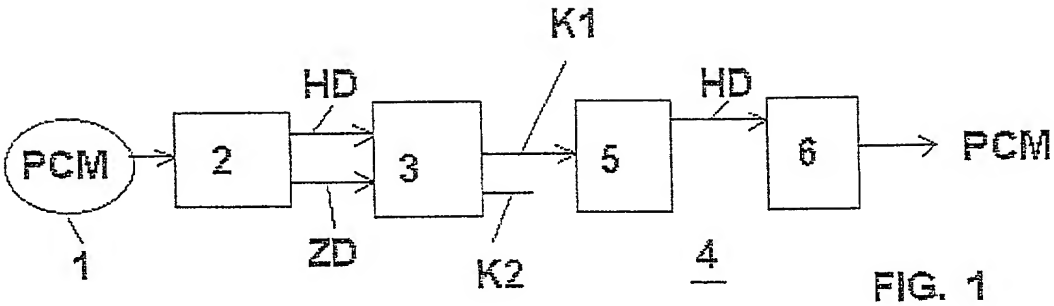


FIG. 1

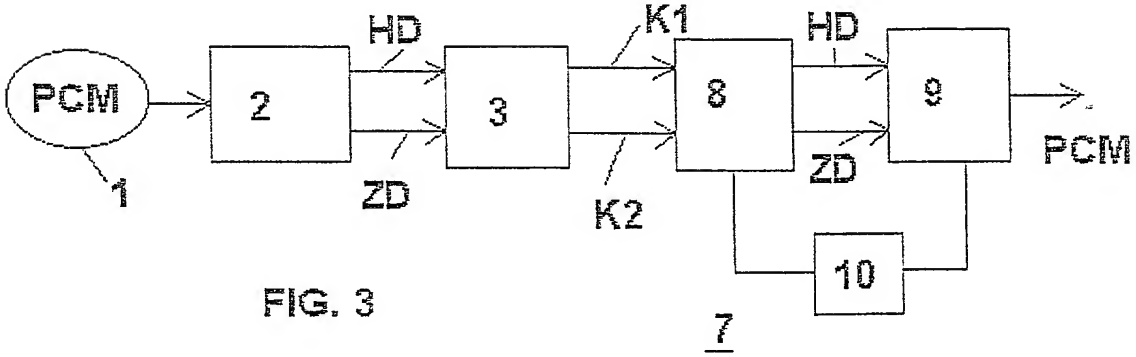
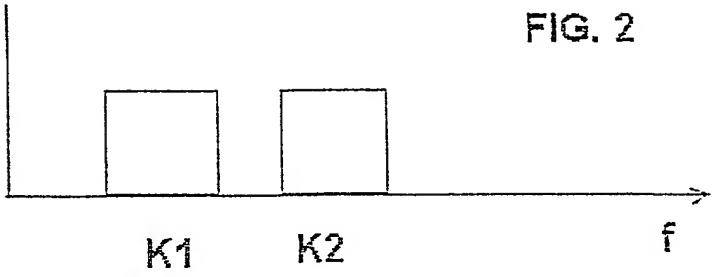


FIG. 3

FIG. 2



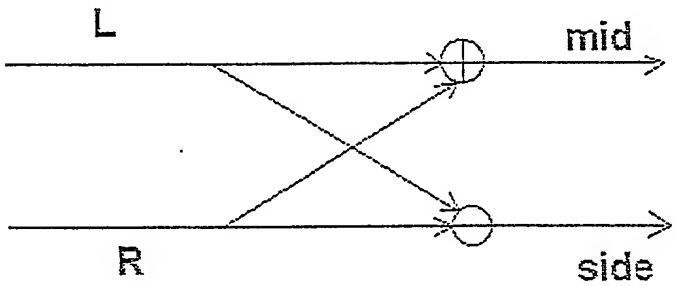


FIG. 4

FIG. 5

base layer	enhancement laYER
mono, bit rate x	stereo auxiliary signal,
mono, bit rate x	auxiliary bit rate
mono, bit rate x	stereo auxiliary signal
stereo, bit rate x	auxiliary bit rate
encoder 1 (e.g CELP)	encoder 2 (e.g. AAC)

auxiliary bit rate

#3

DECLARATION AND POWER OF ATTORNEY FOR NATIONAL STAGE OF PCT PATENT APPLICATION

As a below-named inventor, I hereby declare that:

Frank HOFMANN
Torsten MLASKO

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD FOR PREPARATION OF SOURCE-CODED DATA, AND TRANSMITTER AND RECEIVER THEREFOR** the specification of which was filed as PCT International Application number PCT/DE 00/02059 on June 24, 2000.

I hereby state that I believe the named inventor or inventors in this Declaration to be the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365 (b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior foreign application(s):			Priority claimed:	
199 32 062.4	GERMANY	JULY 12, 1999	X	
(Number)	(Country)	(Date filed)	Yes	No
(Number)	(Country)	(Date filed)	Yes	No

As a named inventor, I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statement

may jeopardize the validity of the application or any patent issued thereon.

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Signature:	Date:	Residence and Full Postal Address:
Full Name of Fourth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Fifth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Sixth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Seventh Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
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Signature:	Date:	Residence and Full Postal Address:
Full Name of Ninth Inventor:	Citizenship:	

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